Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
End Semester Examination: Jan.2022
Faculty: Science and Technology

Program: B.Sc. Code (Gen03) **Semester: I** **SET: C**
Program (Specific): General BSc **Course Type: Core**
Class: F.Y. BSc (Gen)
Max.Marks: 35
Name of the Course: Physics Principles and Applications
Course Code: 22-PHY-112
Time -2Hr
Paper: II

Instructions to the candidate:

1) ***There are 4 sections in the question paper. Write each section on separate page.***
2) ***All Sections are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw a well labelled diagram wherever necessary.***
5) ***Use of calculator and log table is allowed.***

SECTION: A

Q1) Answer the following (Attempt any 5) 5

1. Define metastable state
2. Define hydrogen bond. Give an example.
3. State any two properties of lasers.
4. What are radio waves?
5. What is a communication system?
6. If Frequency of emitted photons is $3x10^{15}$ Hz, calculate the wavelength of radiation**.**

SECTION: B

Q2) Answer the following (Attempt any 5) 10

1. Draw an energy level diagram for He-Ne LASER.
2. Evaluate the radius of 3^{rd} Bohr orbit. (Given-Radius of 1^{st} Bohr orbit = $0.52A^0$)
3. List different type covalent bonds along with necessary diagram.
4. Define centripetal force? Write a mathematical expression for it.
5. What are the selection rules for rotational transition?
6. Distinguish between excitation and de-excitation process.

SECTION: C

Q3) Answer the following (Attempt any 4) 12

1. Draw the rotational energy levels. Write a mathematical equation for rotational energy of rigid diatomic molecules.
2. Explain why laser action cannot occur without population inversion between atomic levels.
3. Differentiate between amplitude and frequency modulation.
4. What are the types of communication cable?
5. Calculate the shortest wavelength in Lyman series. (Given- R= 1.097 $X10^7$ per meter)
6. What are the uses of a pyroelectric thermometer?

SECTION: D

Q4) Answer the following (Attempt any 2) 8

1. With the help of a neat diagram, explain construction and working Frank-Hertz experiment.
2. Write a short note on three level pumping.
3. Explain elements of a communication system. Draw necessary diagram.
4. The series limit wavelength for Balmer series of hydrogen spectrum is $3645A^0$. Calculate the value of Rydberg constant.